

**DG-1145: Combined License Applications for
Nuclear Power Plants (LWR Edition)**



**Office of Nuclear Reactor Regulation
June 13, 2006**

**DG 1145 – Section C.I.2
Site Characteristics**



**13 June 2006
R. Brad Harvey
New Reactor Infrastructure Guidance Development Branch**

Overview

- Section Outlines
- Section References
- Content Highlights
- Referencing a Certified Design

ml060760088

Section Outline

- **C.I.2.1 Geography and Demography**
 - C.I.2.1.1 Site Location and Description
 - C.I.2.1.1.1 Specification of Location
 - C.I.2.1.1.2 Site Area Map
 - C.I.2.1.1.3 Boundaries for Establishing Effluent Release Limits
 - C.I.2.1.2 Exclusion Area Authority and Control
 - C.I.2.1.2.1 Authority
 - C.I.2.1.2.2 Control of Activities Unrelated to Plant Operation
 - C.I.2.1.2.3 Arrangements for Traffic Control
 - C.I.2.1.2.4 Abandonment or Relocation of Roads
 - C.I.2.1.3 Population Distribution
 - C.I.2.1.3.1 Population Within 10 Miles
 - C.I.2.1.3.2 Population Between 10 and 50 Miles
 - C.I.2.1.3.3 Transient Population
 - C.I.2.1.3.4 Low Population Zone
 - C.I.2.1.3.5 Population Center
 - C.I.2.1.3.6 Population Density

Section Outline (cont'd)

- **C.I.2.2 Nearby Industrial, Transportation, and Military Facilities**
 - C.I.2.2.1 Locations and Routes
 - C.I.2.2.2 Descriptions
 - C.I.2.2.2.1 Description of Facilities
 - C.I.2.2.2.2 Description of Products and Materials
 - C.I.2.2.2.3 Pipelines
 - C.I.2.2.2.4 Waterways
 - C.I.2.2.2.5 Highways
 - C.I.2.2.2.6 Railways
 - C.I.2.2.2.7 Airports
 - C.I.2.2.2.8 Projections of Industrial Growth
 - C.I.2.2.3 Evaluation of Potential Accidents
 - C.I.2.2.3.1 Determination of Design Basis Events
 - C.I.2.2.3.2 Effects of Design Basis Events

Section Outline (cont'd)

- **C.I.2.3 Meteorology**
 - C.I.2.3.1 Regional Climatology
 - C.I.2.3.1.1 General Climate
 - C.I.2.3.1.2 Regional Meteorological Conditions for Design and Operating Bases
 - C.I.2.3.2 Local Meteorology
 - C.I.2.3.2.1 Normal and Extreme Values of Meteorological Parameters
 - C.I.2.3.2.2 Potential Influence of the Plant and Its Facilities on Local Meteorology
 - C.I.2.3.2.3 Local Meteorological Conditions for Design and Operating Bases
 - C.I.2.3.3 Onsite Meteorological Measurements Program
 - C.I.2.3.4 Short-Term (Accident Release) Atmospheric Dispersion Estimates
 - C.I.2.3.5 Long-Term (Routine Release) Atmospheric Dispersion Estimates

Section Outline (cont'd)

- **C.I.2.4 Hydrologic Engineering**
 - C.I.2.4.1 Hydrologic Description
 - C.I.2.4.1.1 Site and Facilities
 - C.I.2.4.1.2 Hydrosphere
 - C.I.2.4.2 Floods
 - C.I.2.4.2.1 Flood History
 - C.I.2.4.2.2 Flood Design Considerations
 - C.I.2.4.2.3 Effects of Local Intense Precipitation
 - C.I.2.4.3 Probable Maximum Flood (PMF) on Streams and Rivers
 - C.I.2.4.3.1 Probable Maximum Precipitation (PMP)
 - C.I.2.4.3.2 Precipitation Losses
 - C.I.2.4.3.3 Runoff and Stream Course Models
 - C.I.2.4.3.4 Probable Maximum Flood Flow
 - C.I.2.4.3.5 Water Level Determinations
 - C.I.2.4.3.6 Coincident Wind Wave Activity

Section Outline (cont'd)

- **C.I.2.4 Hydrologic Engineering (cont'd)**
 - C.I.2.4.4 Potential Dam Failures, Seismically Induced
 - C.I.2.4.4.1 Dam Failure Permutations
 - C.I.2.4.4.2 Unsteady Flow Analysis of Potential Dam Failures
 - C.I.2.4.4.3 Water Level at Plant Site
 - C.I.2.4.5 Probable Maximum Surge and Seiche Flooding
 - C.I.2.4.5.1 Probable Maximum Winds and Associated Meteorological Parameters
 - C.I.2.4.5.2 Surge and Seiche Water Levels
 - C.I.2.4.5.3 Wave Action
 - C.I.2.4.5.4 Resonance
 - C.I.2.4.5.5 Protective Structures

Section Outline (cont'd)

- **C.I.2.4 Hydrologic Engineering (cont'd)**
 - C.I.2.4.6 Probable Maximum Tsunami Flooding
 - C.I.2.4.6.1 Probable Maximum Tsunami
 - C.I.2.4.6.2 Historical Tsunami Record
 - C.I.2.4.6.3 Source Generator Characteristics
 - C.I.2.4.6.4 Tsunami Analysis
 - C.I.2.4.6.5 Tsunami Water Levels
 - C.I.2.4.6.6 Hydrography and Harbor or Breakwater Influences on Tsunami
 - C.I.2.4.7 Ice Effects
 - C.I.2.4.8 Cooling Water Canals and Reservoirs
 - C.I.2.4.9 Channel Diversions
 - C.I.2.4.10 Flooding Protection Requirements

Section Outline (cont'd)

- **C.I.2.4 Hydrologic Engineering (cont'd)**
 - C.I.2.4.11 Low Water Considerations
 - C.I.2.4.11.1 Low Flow in Rivers and Streams
 - C.I.2.4.11.2 Low Water Resulting from Surges, Seiches, or Tsunami
 - C.I.2.4.11.3 Historical Low Water
 - C.I.2.4.11.4 Future Controls
 - C.I.2.4.11.5 Plant Requirements
 - C.I.2.4.11.6 Heat Sink Dependability Requirements
 - C.I.2.4.12 Groundwater
 - C.I.2.4.12.1 Description and Onsite Use
 - C.I.2.4.12.2 Sources
 - C.I.2.4.12.3 Subsurface Pathways
 - C.I.2.4.12.4 Monitoring or Safeguard Requirements
 - C.I.2.4.12.5 Design Bases for Subsurface Hydrostatic Loading

Section Outline (cont'd)

- **C.I.2.4 Hydrologic Engineering (cont'd)**
 - C.I.2.4.13 Pathways of Liquid Effluents in Ground and Surface Waters
 - C.I.2.4.14 Technical Specification and Emergency Operation Requirements

Section Outline (cont'd)

- **C.I.2.5 Geology, Seismology, and Geotechnical Engineering**
 - C.I.2.5.1 Basic Geologic and Seismic Information
 - C.I.2.5.1.1 Regional Geology
 - C.I.2.5.1.2 Site Geology
 - C.I.2.5.2 Vibratory Ground Motion
 - C.I.2.5.2.1 Seismicity
 - C.I.2.5.2.2 Geologic and Tectonic Characteristics of Site and Region
 - C.I.2.5.2.3 Correlation of Earthquake Activity with Seismic Sources
 - C.I.2.5.2.4 Probabilistic Seismic Hazard Analysis and Controlling Earthquake
 - C.I.2.5.2.5 Seismic Wave Transmission Characteristics of the Site
 - C.I.2.5.2.6 Safe Shutdown Earthquake Ground Motion

Section Outline (cont'd)

- **C.I.2.5 Geology, Seismology, and Geotechnical Engineering (cont'd)**
 - C.I.2.5.3 Surface Faulting
 - C.I.2.5.3.1 Geologic, Seismological, and Geophysical Investigations
 - C.I.2.5.3.2 Geological Evidence, or Absence of Evidence, for Surface Deformation
 - C.I.2.5.3.3 Correlation of Earthquakes with Capable Tectonic Sources
 - C.I.2.5.3.4 Ages of Most Recent Deformations
 - C.I.2.5.3.5 Relationship of Tectonic Structures in the Site Area to Regional Tectonic Structures
 - C.I.2.5.3.6 Characterization of Capable Tectonic Sources
 - C.I.2.5.3.7 Designation of Zones of Quaternary Deformation in the Site Region
 - C.I.2.5.3.8 Potential for Surface Tectonic Deformation at the Site

Section Outline (cont'd)

- **C.I.2.5 Geology, Seismology, and Geotechnical Engineering (cont'd)**
 - C.I.2.5.4 Stability of Subsurface Materials and Foundations
 - C.I.2.5.4.1 Geologic Features
 - C.I.2.5.4.2 Properties of Subsurface Materials
 - C.I.2.5.4.3 Exploration
 - C.I.2.5.4.4 Geophysical Surveys
 - C.I.2.5.4.5 Excavations and Backfill
 - C.I.2.5.4.6 Groundwater Conditions
 - C.I.2.5.4.7 Response of Soil and Rock to Dynamic Loading
 - C.I.2.5.4.8 Liquefaction Potential
 - C.I.2.5.4.9 Earthquake Design Basis
 - C.I.2.5.4.10 Static Stability
 - C.I.2.5.4.11 Design Criteria
 - C.I.2.5.4.12 Techniques to Improve Subsurface Conditions

Section Outline (cont'd)

- **C.I.2.5 Geology, Seismology, and Geotechnical Engineering (cont'd)**
 - C.I.2.5.5 Stability of Slopes
 - C.I.2.5.5.1 Slope Characteristics
 - C.I.2.5.5.2 Design Criteria and Analyses
 - C.I.2.5.5.3 Logs of Borings
 - C.I.2.5.5.4 Compacted Fill

Section References

- **Regulations**
 - 10 CFR Part 20: Subpart D
 - 10 CFR Part 50: §50.34, Appendixes A, I, and S
 - 10 CFR Part 52
 - 10 CFR Part 100: Subpart B
- **Regulatory Guide 1.70**
- **Other Applicable Regulatory Guides**
 - e.g., 1.23, 1.26, 1.27, 1.76, 1.78, 1.91, 1.109, 1.111, 1.112, 1.132, 1.138, 1.145, 1.165, 1.194, 1.198, 4.7
- **NUREGs**
 - NUREG/CR-6372; NUREG/CR- 6728
- **ASCE 43-05**
- **“Lessons Learned” from 3 docketed ESP applications**
 - Review Standard (RS)-002

Content Highlights

- **Meteorology**
 - DG-1145 Section 2.3.4 now includes control room atmospheric dispersion factors
 - Proposed Rev.1 to RG 1.76 (DG-1143)
 - Lowers max design-basis tornado wind speeds to 300 mph
 - Includes revised tornado missiles (moved from SRP 3.5.1.4)
 - Potential 3rd Proposed Rev. 1 to RG 1.23 (Meteorological Monitoring)
 - Tower and instrument siting criteria
 - System Accuracy
 - Data process, recording, and displays

Content Highlights

- **Geology, Seismology, and Geotechnical Engineering**
 - DG-1145 Section 2.5.2 now includes the option for using a performance-based approach to determine the SSE
 - Performance-Based Approach described in ASCE 43-05 (SDB-5D)
 - New RG (DG-1146) to provide guidance on implementation performance-based approach as well as site response analysis
 - Current approach in RG 1.165 still valid

Referencing a Certified Design

If a COL application references a certified design, which areas remain to be reviewed by the NRC staff?

Referencing a Certified Design

- Provide the information requested in DG-1145 Section C.I.2
- Also provide a table comparing the site parameters specified in the DC with the site characteristics presented in Section C.III.1.2
- If the DC site parameters do not bound the actual site characteristics, reference the FSAR section that demonstrates by some other means that the proposed facility is acceptable at the proposed site

Referencing a Certified Design

- Changes from the referenced DC to address discrepancies between the DC site parameters and the actual site characteristics
 - must be in accordance with Section VIII, “Processes for Changes and Departures,” of the respective DC rule appended to 10 CFR Part 52
 - additional guidance is provided in DG-1145 Section VI.3, “General Description of Change Processes”

Questions?

Section C.I.13.5, Plant Procedures

- Discussed briefly during public workshop in May 2006
- Agreed to receive comments and questions on Section C.I.13.5 for discussion during public workshop in June 2006

Section C.I.13.5, Public Comments and Questions

- 8 comments/questions received on 13.5
- Discussion of proposed responses